

SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS
DURING MARCH, 1924By HERBERT H. KIMBALL, In Charge, Solar Radiation
Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing the measurements, the reader is referred to the REVIEW for January, and February, 1924 53:42 and 113.

From Table 1 it is seen that solar radiation intensities averaged slightly below normal values for March at all three stations.

Table 2 shows that the total solar and sky radiation received on a horizontal surface averaged slightly above normal at Washington and below normal at Madison and Lincoln.

Skylight-polarization measurements made on six days at Washington give a mean of 55 per cent with a maximum of 63 per cent on the 24th. These are slightly below the average March values. At Madison no measurements were obtained as the ground was covered with snow throughout the month.

TABLE 1.—Solar radiation intensities during March, 1924
[Gram-calories per minute per square centimeter of normal surface]
Washington, D. C.

Date	8 a. m.	Sun's zenith distance										Noon	
		78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°			
		Air mass											Local mean solar time
		A. M.					P. M.						
	e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.		
Mar. 3	3.15					1.02					3.81		
4	3.81		0.54	0.69	0.90						4.57		
6	4.17			0.91							5.23		
12	3.63					1.50	1.28				3.45		
13	2.30	0.81	0.93	1.09	1.23		0.95				2.87		
17	2.36		0.87	0.98	1.17	1.39					2.87		
19	3.81		0.70	0.90	1.21		0.96				3.00		
22	4.57			1.03	1.18	1.36					4.17		
24	4.17			1.04	1.24	1.53					6.50		
28	3.99		0.70	0.84	1.09	1.41					3.99		
31	3.30	0.59	0.73	0.90	1.11	1.36	1.04				3.45		
Means		(0.70)	0.74	0.93	1.13	1.42	1.06						
Departures		-0.01	-0.07	-0.01	-0.02	±0.00	-0.05						

TABLE 1.—Solar radiation intensities during March, 1924—Contd

Madison, Wisconsin

Date	8 a.m.	Sun's zenith distance										Noon	
		78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°			
		Air mass											Local mean solar time
		A. M.						P. M.					
	e	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0	5.0	e		
Mar. 5	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.		
13	2.26		1.02	1.13	1.30						2.74		
14	2.95				1.30						3.30		
15	1.78				1.37						2.16		
18	1.45				1.32	1.54					2.62		
27	3.00						1.31	1.16			3.30		
	4.57						1.28				6.76		
Means			(1.02)	(1.13)	1.32		(1.28)	(1.16)					
Departures			-0.02	-0.06	±0.00		-0.03	±0.00					

Lincoln, Nebr.

Mar. 6	2.87	1.02			1.38	1.53						2.36
11	2.36		0.97	1.13	1.32	1.52	1.32	1.13	0.96	0.84		2.62
21	3.45			0.98	1.20	1.51	1.19	0.92				3.99
26	3.81		0.91	1.11	1.29	1.49	1.30	1.14	0.99			4.95
27	4.17		0.87	1.08	1.18		1.20	0.99	0.83			7.57
Means		(1.02)	0.92	1.05	1.27		1.25	1.04	0.93	(0.84)		
Departures		+0.14	-0.01	±0.00	-0.02		-0.02	-0.03	+0.01	+0.05		

* Extrapolated

TABLE 2.—Solar and sky radiation received on a horizontal surface

Week beginning--	Average daily radiation				Average daily departure for the week			Excess or deficiency since first of year		
	Chi-	Wash-	Mad-	Lin-	Wash-	Mad-	Lin-	Wash-	Mad-	Lin-
	cago	ington	ison	coln	ington	ison	coln	ington	ison	coln
Feb. 26	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Mar. 5	158	290	224	334	+8	-60	-9	+643	-1,329	-379
12	124	228	286	372	-82	-23	+4	+68	-1,498	-351
19	200	483	372	288	+143	+46	-106	+1,072	-1,169	-1,095
26	197	376	228	377	+15	-117	-38	+1,179	-1,985	-1,359
	153	314	296	443	-63	-66	+14	+735	-2,445	-1,261

551.506 (261.1) WEATHER OF NORTH AMERICA AND ADJACENT OCEANS
NORTH ATLANTIC OCEAN

By F. A. YOUNG

The following table shows the average pressure for the month at a number of land stations on the coast and islands of the North Atlantic. The readings are for 8 a. m., 75th meridian time, and the departures are only approximate, as the normals were taken from the Pilot Chart and are based on Greenwich mean noon observations, which correspond to 7 a. m., 75th meridian time.

Station	Average pressure	Departure
	Inches	Inches
St. Johns, Newfoundland	29.48	-0.36
Nantucket	29.71	-0.29
Hatteras	29.85	-0.17
Key West	29.97	-0.05
New Orleans	29.98	-0.04
Swan Island	29.87	-0.13
Turks Island	30.02	±0.00
Bermuda	29.84	-0.20
Horta, Azores	29.65	-0.49
Lerwick, Shetland Islands	29.84	+0.13
Valencia, Ireland	29.78	-0.12
London	29.89	-0.07

It will be noticed that the average pressure at Horta, Azores, was very much below the normal for March; the barometer at that station read above 30 inches only on the 1st and the 28th to 31st, while the lowest reading, 29.20 inches, occurred on the 9th. During the greater part of the month the North Atlantic HIGH was conspicuous by its absence, and the persistent intrusion of low pressure over the region usually occupied by this so-called center of action was responsible for abnormal weather conditions over a large section of the ocean.

Judging from reports received, the number of days on which winds of gale force were reported over the greater part of the steamer lanes was not far from the normal as shown on the Pilot Chart. Over the western section of the ocean and in southern waters, west of the Azores, gales were unusually prevalent, while east of the 25th meridian comparatively moderate weather was the rule.

The number of days with fog was apparently less than usual over the Grand Banks, and about normal in the vicinity of the European and American coasts. A most

remarkable feature was the prevalence of fog in the Gulf of Mexico where it was observed on nine days.

On the 1st and 2d there occurred the only well-developed and severe disturbance in the immediate vicinity of the British Isles, and on the latter date moderate to strong gales were reported from a limited area between the 45th and 60th parallels. Storm log:

British S. S. *New York City*.

Gale began on February 29th, wind WNW. Lowest barometer 28.87 inches at 8 a. m. on the 2d, wind WNW., 8, in latitude 50° 54' N., longitude 15° W. End on the 2d, wind NNW. Highest force of wind 9, WNW.; shifts WNW.-NW.-N.

From the 3d to the 7th the region between the Azores and Bermudas was covered by an area of low pressure, and during this period heavy weather was reported by a number of vessels between the 30th and 45th parallels. storm log:

American S. S. *Coelleda*:

Gale began on the 3d, wind NW. Lowest barometer 29.74 inches at 4 p. m. on the 3d, wind NW. 7, in latitude 38° 22' N., longitude 65° W. End on the 6th, wind NW. Highest force of wind, 9, NW.; steady NW.

On the 8th a LOW was central near latitude 42° N., longitude 62° W.; its progress is shown on Maps VIII to XIII, which cover the period from the 9th to 14th, inclusive, when especially heavy weather prevailed over a large part of the ocean. Storm logs:

American S. S. *West Haven*:

Gale began on the 7th, wind NW. Lowest barometer 29.47 inches at 4 a. m. on the 9th, wind NW., 9, in latitude 38° 19' N., longitude 66° 54' W. End on the 10th, wind NNW. Highest force of wind 11; steady NW.

American S. S. *Radiant*:

Gale began on the 10th, wind SE. Lowest barometer 29.23 inches at 7 a. m. on the 10th, wind SE., 6, in latitude 33° 40' N., longitude 75° 30' W. End on the 12th, wind NW. Highest force of wind 11; shifts SE.-WNW.

American S. S. *Collingsworth*:

Gale began on the 11th, wind W. Lowest barometer 29.64 inches at 10 a. m. on the 11th, wind W., 7, in latitude 26° 23' N., longitude 70° 22' W. End on the 13th, wind WNW. Highest force of wind 10; shifts SW.-W.

American S. S. *F. H. Hillman*:

Gale began on the 13th, wind SSW. Lowest barometer 29.61 inches at 10 a. m. on the 13th, wind SW., 8, in latitude 29° 10' N., longitude 48° 15' W. End on the 15th, wind WSW. Highest force of wind, 10 WNW.; shifts SW.-WSW.

From the 15th to the 19th there was a well-developed low in the vicinity of Newfoundland, that moved but little during this period, and a number of vessels between the 40th meridian and the American coast encountered moderate to strong gales, accompanied by hail and snow.

Charts XIV and XV show the conditions on the 21st and 22d, respectively, when a severe disturbance prevailed between the Bermudas and Hatteras that is described elsewhere in the REVIEW. These maps also show a second and much deeper depression northwest of the Azores, which was attended by moderate to strong gales. Storm log:

British S. S. *Maryland*:

Gale began on the 22d. Lowest barometer 28.42 inches at 3 p. m. on the 22d, wind SSE., in latitude 46° 28' N., longitude 32° 40' W. End at midnight on the 22d, wind NNW. Highest force of wind 9; shifts SSE.-NNW.

By the 23d the western low was central near latitude 40° N., longitude 45° W., while the second depression was somewhere between the 30th meridian and the coast of Great Britain. Storm log:

American S. S. *Balsam*:

Gale began on the 22d, wind NE. Lowest barometer 29.31 inches at noon on the 22d, wind NE., 7, in latitude 39° 44' N., longitude 60° 46' W. End on the 25th, wind NE., 9. Highest force of wind 9, NE.; shifts NE.-N.-NE.

On the 27th there was a disturbance central about 200 miles south of Halifax and moderate to strong gales prevailed as far south as the Bermudas; by the 28th it was over Newfoundland, while the storm area had contracted considerably in extent. Storm log:

British S. S. *Maryland*:

Gale began on the 27th, wind SW. Lowest barometer 29.11 inches at 6 p. m. on the 27th, wind W., in latitude 40° 59' N., longitude 63° 30' W. End on the 28th, wind WNW. Highest force of wind 10, WNW.; shifts W.-WNW.

On the 29th Hatteras was in the southeastern quadrant of a LOW that moved east-northeastward, and on the 30th was central a short distance southeast of Nantucket, while by the 31st it was near St. Johns, Newfoundland. Storm log:

Italian S. S. *Posillipo*:

Gale began on the 29th, wind SW. Lowest barometer 29.68 inches at 12:30 a. m. on the 29th, wind SW., 9, in latitude 37° N., longitude 66° 05' W. End on the 30th, wind WNW. Highest force of wind 10, SW.; shifts SW.-WNW.

On the 30th there was a second disturbance near latitude 48° N., longitude 45° W., that moved rapidly eastward and by the 31st was in the vicinity of latitude 50° N., longitude 35° W. Storm log:

Belgian S. S. *Menapier*:

Gale began on the 30th, wind SSE., 3. Lowest barometer 29.75 inches at 5 a. m. on the 30th, wind S., 11, in latitude 44° 44' N., longitude 37° 37' W. End on the 31st, wind W. Highest force of wind 11, SSW.; shifts S.-SSW.

551.506 (265.2) NORTH PACIFIC OCEAN

By WILLIS E. HURD

Fine weather prevailed over most of the middle latitudes of the north Pacific Ocean during March, so that vessels following the central and southern routes as a rule experienced smooth sailing. Neither was the weather altogether rough and disagreeable along the northern routes, although gales occurred daily over some portion of the upper waters of the sea.

One factor which contributed largely to the generally settled weather over the eastern part of the ocean was the permanence of the great high-pressure area bridging Hawaii and the American coast. During several preceding months this anticyclone had been frequently and seriously disturbed, but in March it persisted with scarcely a break throughout the month, only fluctuating somewhat with the changing conditions surrounding it.

Hawaii experienced nearly normal weather, except that the rainfall was considerably deficient. The wind velocity averaged 9.4 miles an hour, and maximum velocities exceeded 25 miles per hour on six days, the highest being 34 miles from the east on the 1st. The trades were very steady in this region, and there were few departures from easterly and northeasterly directions. These departures were generally on the 21st to 24th during the prevalence of a depression to the eastward and northward of Midway Island. A slight disturbance appeared to the northeastward of Hawaii on the 28th to 30th, but no gales were reported from it.

Naturally the greater number of storm winds resulted from the activities of the Aleutian Low. This cyclone was well developed during the first two decades of March, though oscillating north and south and east and west over a considerable area. The average center was nearly over or to the westward of Dutch Harbor. From